

Source: S1

Title: UMTS Bearer QOS Attributes - Service requirements
Proposed Change Request to TS 22.05

Document for: INFORMATION

Agenda Item: 5.1

This CR on Quality of Service 2205A009 is the output of the S1_QoS adhoc meeting that took place on 7-8 April in Copenhagen and that brought together 14 delegates with a majority representation from S2.

Objectives of this CR is to align S1 Service requirements with S2, state of progress in QoS.

Given tight time frames, this is still being debated and has, therefore, not yet been agreed by S1. The plan is to finalise this CR at our next S1 meeting, May 10-12, 1999 in the UK.

It is, therefore, presented here for your Information and furthermore, for your invaluable comments to help accelerate the process.

CHANGE REQUEST No :		A009	<i>Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.</i>	
Technical Specification / Report UMTS		22.05	Version: 3.3.1	
Submitted to	#3	for approval	<input checked="" type="checkbox"/>	without presentation ("non-strategic")
TSG_SA				<input checked="" type="checkbox"/>
<i>list TSG plenary meeting no. here ↑</i>		for information	<input type="checkbox"/>	with presentation ("strategic")
				<input type="checkbox"/>

PT SMG CR cover form is available from: http://docbox.etsi.org/tech-org/msg/Document/msg/tools/CR_form/crf28_1.zip

Proposed change affects: USIM TE Network
(at least one should be marked with an X)

Work item: Quality of service requirements

Source: TSGS1 ad-hoc on QoS **Date:** April 8, 1999

Subject: Changes to UMTS bearer service attributes

Category:	F Correction	<input type="checkbox"/>	Release:	Phase 2	<input type="checkbox"/>
	A Corresponds to a correction in an earlier release	<input type="checkbox"/>		Release 96	<input type="checkbox"/>
<i>(one category and one release only shall be marked with an X)</i>	B Addition of feature	<input type="checkbox"/>		Release 97	<input type="checkbox"/>
	C Functional modification of feature	<input checked="" type="checkbox"/>		Release 98	<input type="checkbox"/>
	D Editorial modification	<input type="checkbox"/>		UMTS 99	<input checked="" type="checkbox"/>

Reason for change: To align the requirements on UMTS bearer service attributes and value ranges with the current state of work on this subject in other groups.

Clauses affected: 4.2, 5.2, 5.2.1, 5.2.2, 5.4

Other specs affected:	Other releases of same spec	<input type="checkbox"/>	→ List of CRs:	
	Other core specifications	<input type="checkbox"/>	→ List of CRs:	
	MS test specifications / TBRs	<input type="checkbox"/>	→ List of CRs:	
	BSS test specifications	<input type="checkbox"/>	→ List of CRs:	
	O&M specifications	<input type="checkbox"/>	→ List of CRs:	

Other comments:

<----- double-click here for help and instructions on how to create a CR.

4.2 Basic telecommunication services

Basic telecommunication services are divided in two broad categories;

- bearer services, which are telecommunication services providing the capability of transmission of signals between access points;
- teleservices, which are telecommunication services providing the complete capability, including terminal equipment functions, for communication between users according to protocols established by agreement between network operators.

Figure 1 illustrates these definitions.

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NOTE 1: In order to limit the complexity of the figure, only one transit network is shown.

NOTE 2: The terminating network type may include a UMTS network, either the originating one or another one.

NOTE 3: The bearer service terminates in the mobile station.

Figure 1; Basic telecommunication services supported by a UMTS network

4.2.1 Bearer services

The characterisation of a bearer service is made by using a set of attributes. A bearer service attribute is a specific characteristic that distinguishes it from other bearer services. Particular values are assigned to each attribute when a given bearer service is described and defined.

The attributes define the service characteristics as they apply at a given reference point where the user accesses the bearer service. The description of a bearer service by the method of attributes is composed of technical attributes.

A list of definitions of attributes and values used for bearer services is contained in clause 5.

The bearer services are negotiable and can be used flexibly by applications.

4.2.2 Teleservices

Clause 6 defines both standardised and non-standardised teleservices. Some teleservices are standardised because that interworking with other systems have been recognised as a requirement. Other teleservices shall not be standardised. A decoupling between lower layer (i.e. bearer attributes) and higher layer capabilities will be necessary for the development of teleservices.

4.3 Supplementary services

A supplementary service modifies or supplements a basic telecommunication service. Consequently, it cannot be offered to a user as a stand alone service. It must be offered together or in association with a basic telecommunication service. The same supplementary service may be applicable to a number of basic telecommunication services.

Two methods are used for the characterisation of supplementary services;

5.2 Description of bearer services

Bearer services are characterised from a static point of view by a set of low layer attributes. This set has been chosen so that a bearer service can be entirely defined by giving a value to each attribute of the set. In particular, the set and the associated allowed values enable characterisation of future (not yet used or foreseen) transfer needs.

Giving one of the possible values to each attribute defines a possible bearer service. However, any combination is neither meaningful nor necessarily supported by the UMTS system. This section defines the attributes and their possible values. The authorised combinations are specified in the following sections.

The parameters of the set are grouped into two categories;

- Information transfer attributes, which characterise the network transfer capabilities required for transferring user information between two or more access points.
- Information quality attributes, which characterise the quality of the user information transferred between two or more access points.

Most of the attributes presented further down may be attributed several values when the bearer service required by an application involves more than one traffic type (connection/connectionless) or more than one connection.

It shall be possible to negotiate/re-negotiate all of the attributes presented in this clause at call set-up/ during the call (mobile or network initiated).

To enable asymmetric services, the values of some attributes need to be specified separately for the up- and downlink respectively.

It shall be possible to differentiate between the traffic handling of different bearers, at least within the interactive traffic class.

5.2.1 Information transfer attributes

~~Connection mode attribute~~

~~The two possible values for this attribute are connection oriented and connectionless. In a connection oriented mode, information is delivered to the destination entity in the same order as it was provided by the source entity, but an establishment/release phase is required at the beginning and the end of the information transfer. In a connectionless mode, information can directly be transferred, but with no guaranty of ordered delivery.~~

~~Delivery order attribute~~

~~[FFS]~~

~~Traffic type class attribute~~

~~The four possible values for this attribute are constant bit rate, variable bit rate, available bit rate and unspecified bit rate conversational, streaming, interactive and background.~~

~~Note: The use of this attribute as a separate attribute is still under discussion.~~

~~Symmetry attribute~~

~~The three possible values for this attribute are unidirectional, bi-directional symmetric and bi-directional asymmetric.~~

~~Communication configuration attribute~~

~~This attribute indicate the spatial arrangement for transferring information between the implicated access points. The possible values are point-to-point, and point-to-multipoint. When the value of the attribute is point-to-multipoint, it shall be further characterised as multicast or broadcast. The addresses of the source entity and the destination entities should also be provided. One multipoint address should be reserved for broadcasting.~~

~~Information transfer rate attributes~~

~~Information transfer rate is the amount of information transmitted per unit of time from a source access point to destination access point(s).~~

The three attributes used to characterise the information transfer rate are the peak bit rate, the minimum bit rate and the mean bit rate. The possible values for these three attributes are not a limited set, but a continuous range of values. More parameters may certainly be needed, such as the sustainable bit rate or the occupancy (FFS).

Maximum bit rate

This attribute specifies the maximum allowed bit rate for a given UMTS bearer service.

Guaranteed bit rate

This attribute specifies the minimum guaranteed bit rate for a UMTS bearer service.

5.2.2 Information quality attributes

Information quality attributes characterise the bit integrity and delay requirements of the applications. Other parameters may be needed.

Maximum transfer delay attribute

This attribute sets the maximum transfer delay of the information. The two reference points for the maximum transfer delay are the Iu interface and the point located between the mobile termination and the terminal adaptation function. The possible values for this attribute are not a limited set, but a continuous range of values. The maximum time between reception of the last bit of a packet at the UMTS bearer service entry point to the delivery of the last bit of the packet at the UMTS bearer service exit point.

Maximum two point delay variation attribute

This attribute sets the variation in the received information. This attribute is important for real time services, e.g. video conference, where a value approaching 0 would typically be requested. The possible values for this attribute are not a limited set, but a continuous range of values. This attribute specifies the maximum difference between transfer delay of two arbitrary packets between the UMTS bearer service entry points.

Bit error ratio attribute

The ratio between incorrect and total transferred information bits. The possible values for this attribute are not a limited set, but a continuous range of values. This attribute specifies the bit error ratio defined as the fraction of bit errors in the delivered bit stream.

Error characteristics attribute

This attribute characterises the arrivals of errors. The two possible values are uniform and bursty.

5.3 Supported bit rates

It shall be possible for one application to specify its traffic requirements to the network by requesting a bearer service with any value for the connection mode, traffic type, symmetry and information transfer rate attributes. It shall be possible for the network to satisfy these requirements without wasting resources on the radio and network interfaces due to granularity limitations in bit rates.

It shall be possible for one mobile termination to have several active bearer services simultaneously, each of which could be connection oriented or connectionless.

The only limiting factor for satisfying application requirements shall be the cumulative bit rate per mobile termination at a given instant (i.e. when summing the bit rates of one mobile termination's simultaneous connection oriented and connectionless traffic, irrespective of the traffic being real time or non real time) in each radio environment :

- At least 144 kbits/s in satellite radio environment (Note 1).
- At least 144 kbits/s in rural outdoor radio environment.
- At least 384 kbits/s in urban/suburban outdoor radio environments.
- At least 2048 kbits/s in indoor/low range outdoor radio environment.

NOTE 1 : This Peak Bit Rate may only be achieved in a nomadic operating mode.

5.4 Supported QoS

It shall be possible for one application to specify its QoS requirements to the network by requesting a bearer service with any value for the maximum transfer delay, delay variation, bit error rate and error characteristic attributes.

The following table indicates the range of values that shall be supported by UMTS for the QoS attributes. These requirements are valid for both connection and connectionless traffic. It shall be possible for the network to satisfy these requirements without wasting resources on the radio and network interfaces due to granularity limitations in QoS.

	Real Time (Constant Delay) Conversational	Real Time (Constant Delay) Streaming	Non-Real Time (Variable Delay) Interactive
Operating environment	BER/Max Transfer Delay	BER/Max Transfer Delay	BER/Max Transfer Delay
Satellite (Terminal relative speed to ground up to 1000 km/h for plane)	Max Transfer Delay less than 400 ms BER 10 ⁻³ - 10 ⁻⁷ (Note 1)	Max Transfer Delay less than 400 ms BER 10 ⁻³ - 10 ⁻⁷ (Note 1)	Max Transfer Reference Packet Delay 1200 ms or more (Note 24) BER = 10 ⁻⁵ to 10 ⁻⁸
Rural outdoor (Terminal relative speed to ground up to 500 km/h) (Note 3)	Max Transfer Delay 200 - 300 ms (Note 2) BER 10 ⁻³ - 10 ⁻⁷ (Note 1)	Max Transfer Delay 150 ms or more (Note 2) BER 10 ⁻³ - 10 ⁻⁷ (Note 1)	Max Transfer Reference Packet Delay 150 ms or more (Note 24) BER = 10 ⁻⁵ to 10 ⁻⁸
Urban/Suburban outdoor (Terminal relative speed to ground up to 120 km/h)	Max Transfer Delay 200 - 300 ms (Note 2) BER 10 ⁻³ - 10 ⁻⁷ (Note 1)	Max Transfer Delay 150 ms or more (Note 2) BER 10 ⁻³ - 10 ⁻⁷ (Note 1)	Max Transfer Reference Packet Delay 150 ms or more (Note 24) BER = 10 ⁻⁵ to 10 ⁻⁸
Indoor/ Low range outdoor (Terminal relative speed to ground up to 10 km/h)	Max Transfer Delay 200 - 300 ms (Note 2) BER 10 ⁻³ - 10 ⁻⁷ (Note 1)	Max Transfer Delay 150 ms or more (Note 2) BER 10 ⁻³ - 10 ⁻⁷ (Note 1)	Max Transfer Reference Packet Delay 150 ms or more (Note 24) BER = 10 ⁻⁵ to 10 ⁻⁸
NOTE 1; There is likely to be a compromise between BER and delay.			
NOTE 2; The Max Transfer Delay should be here regarded as the target value for 95% of the traffic.			
NOTE 3; The value of 500 km/h as the maximum speed to be supported in the rural outdoor environment in order to provide service on high speed vehicles (e.g. trains). This is not meant to be typical (250 km/h is more typical).			
NOTE 4; Reference packet delay is defined as the transfer delay for a burst comprising a small reference packet.			

5.5 Supported topologies

It shall be possible for an application to specify its traffic topology requirements to the network by requesting a bearer service with any value for the communication configuration attribute. However, some combinations with the symmetry attribute are not authorised. The supported configurations are :

- 1) Point-to-Point

- Uni-Directional
 - Bi-Directional
 - Symmetric
 - Asymmetric
- 2) Uni-Directional Point-to-Multipoint
- Multicast
 - Broadcast

Annex C (informative) :

Change history

Change history					
SMG No.	TDoc. No.	CR. No.	Section affected	New version	Subject/Comments
SMG#25				3.0.0	Approved at SMG#25 Sophia Antipolis 17-20 March 1998
SMG#26	98-0325	001	Section 3.1 (a new definition is added) and section 5 (the current text is clarified).	3.1.0	Clarification of the sections where the bearer services are characterised.
Pre-SMG#28	SMG1 Tdoc 98-0864	A002	3.2, 4.1, 4.3, 4.4, 6.1, 6.4.1, 6.4.3, 6.4.4., 6.4.5, 8.2, 8.3, 8.5, 8.7, 8.8, 9.1, 9.2	Draft 3.2.0	SMG1 Agreed at this stage Aligning this specification with 22.00
Pre-SMG#28	SMG1 Tdoc 98-0870	003	Sections 2, 9	Draft 3.2.0	SMG1 Agreed at this stage References to relevant GSM specs has been added.
Pre-SMG#28	SMG1 Tdoc 0895 (865#5)	004	Annex B	Draft 3.2.0	SMG1 Agreed at this stage In line with views expressed by SMG2 and SMG12 about descriptions and analysis of communication schemes.
Pre-SMG#28		005	Section 8	Draft 3.2.0	Service features are only used to create services (as building blocks) and not to modify and delete services. (Added Jan 27, 1999)
SMG#28				Version 3.2.0	Approved Versions
SA#2 Florida		006	6.4	Version 3.3.0	Cell Broadcast Service in UMTS.
				Version 3.3.0	reformatted for TSG SA
				<u>Version 3.3.1</u>	
SA#3				<u>Version 3.4.0</u>	<u>Alignment and change of UMTS bearer service parameters</u>

History

Document history	
June 1998	Version 3.1.0 Unpublished
January 1999	v.3.2.0 - with 4 CRs accepted by SMG1 - Presented to TSG SA WG1 - To be presented to SMG#28 for Approval
February 1999	3.3.0 SMG#28
March 1999	3.3.1
<u>April 1999</u>	<u>3.3.4</u>